S
622.34
M26pibr
1988
Northern
Engineering and
Testing, Inc
Pre-design
inventory of the
south Boulder
River drainage,

Northern
Engineering
and Testing, Inc.

PRE-DESIGN INVENTORY OF THE SOUTH BOULDER RIVER DRAINAGE, MADISON COUNTY, MONTANA

1987 ABANDONED MINE RECLAMATION PROGRAM

STATE DOCUMENTS COLLECTION

OCT 9 1991

MONTANA STATE LIBRARY
1515 E. 6th AVE.
HELENA, MONTANA 59620

PLEASE RETURN

MONTANA STATE LIBRARY
S 622.34 M26pibr 1988 c.1
Pre-design inventory of the south Boulde
3 0864 00073097 1

PRE-DESIGN INVENTORY OF THE SOUTH BOULDER RIVER DRAINAGE, MADISON COUNTY, MONTANA

1987 ABANDONED MINE RECLAMATION PROGRAM

Prepared by Northern Engineering and Testing, Inc.
P. O. Box 4699
1610 B Street
Helena, Montana 59604

February 17, 1988

TABLE OF CONTENTS

	Page
1.0 Summary	1
2.0 Hazardous Mine Openings and Structures	4
3.0 Water Quality	5
4.0 Recommendations	7

LIST OF FIGURES

Figure 1 - Drainage Basin Map 3

LIST OF TABLES

Table 1 - Mine Discharge Summary 6

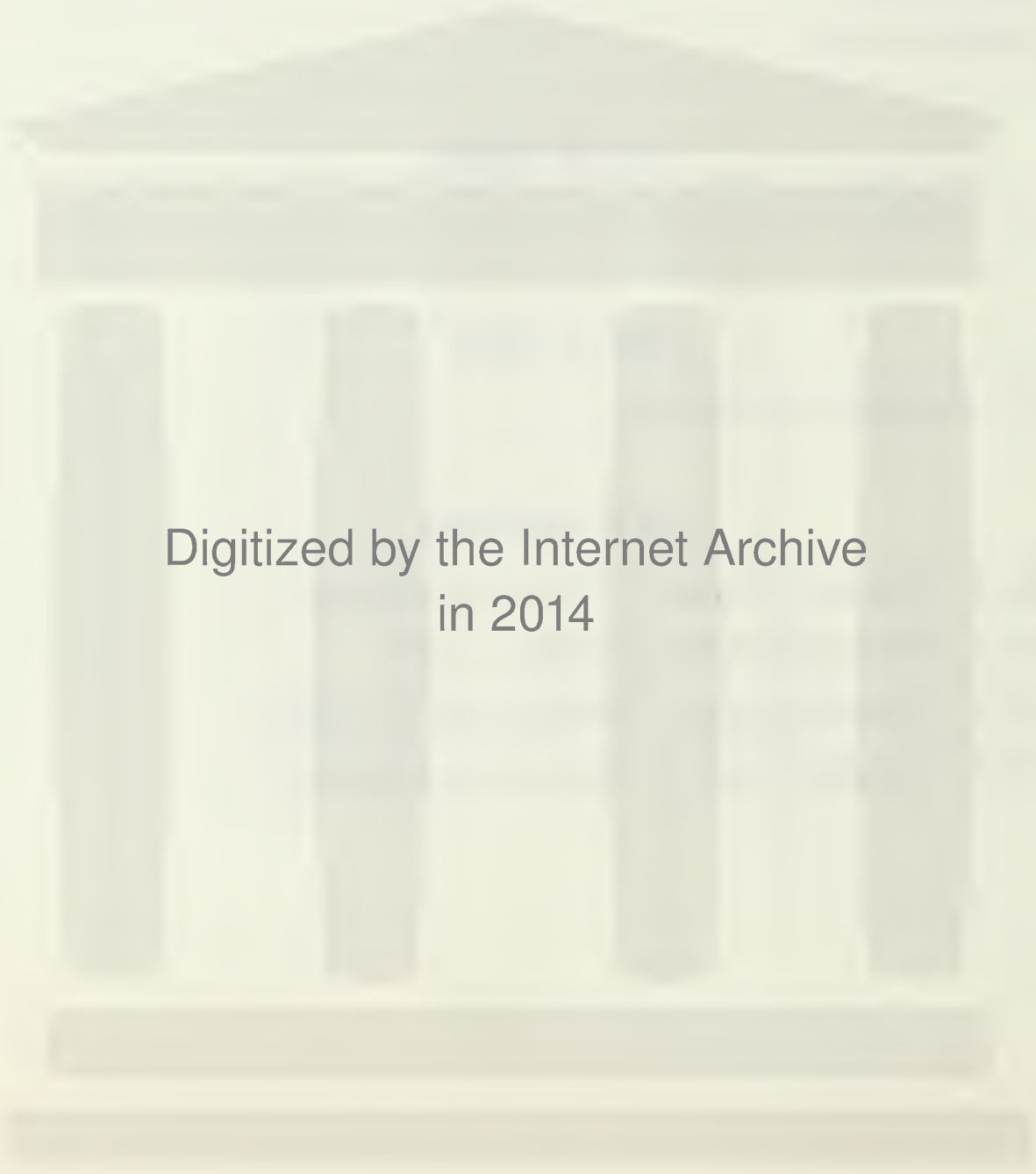
LIST OF APPENDICES

Appendix A - Data Base Printout - Prioritized Ranking

Appendix B - Memorandum issued dated May 1, 1987

Appendix C - Laboratory Report - Mammoth Portal Discharge

Appendix D - Analytical Report - Mammoth Mine Discharges



Digitized by the Internet Archive
in 2014

https://archive.org/details/predesigninvento1988nort

1.0 SUMMARY

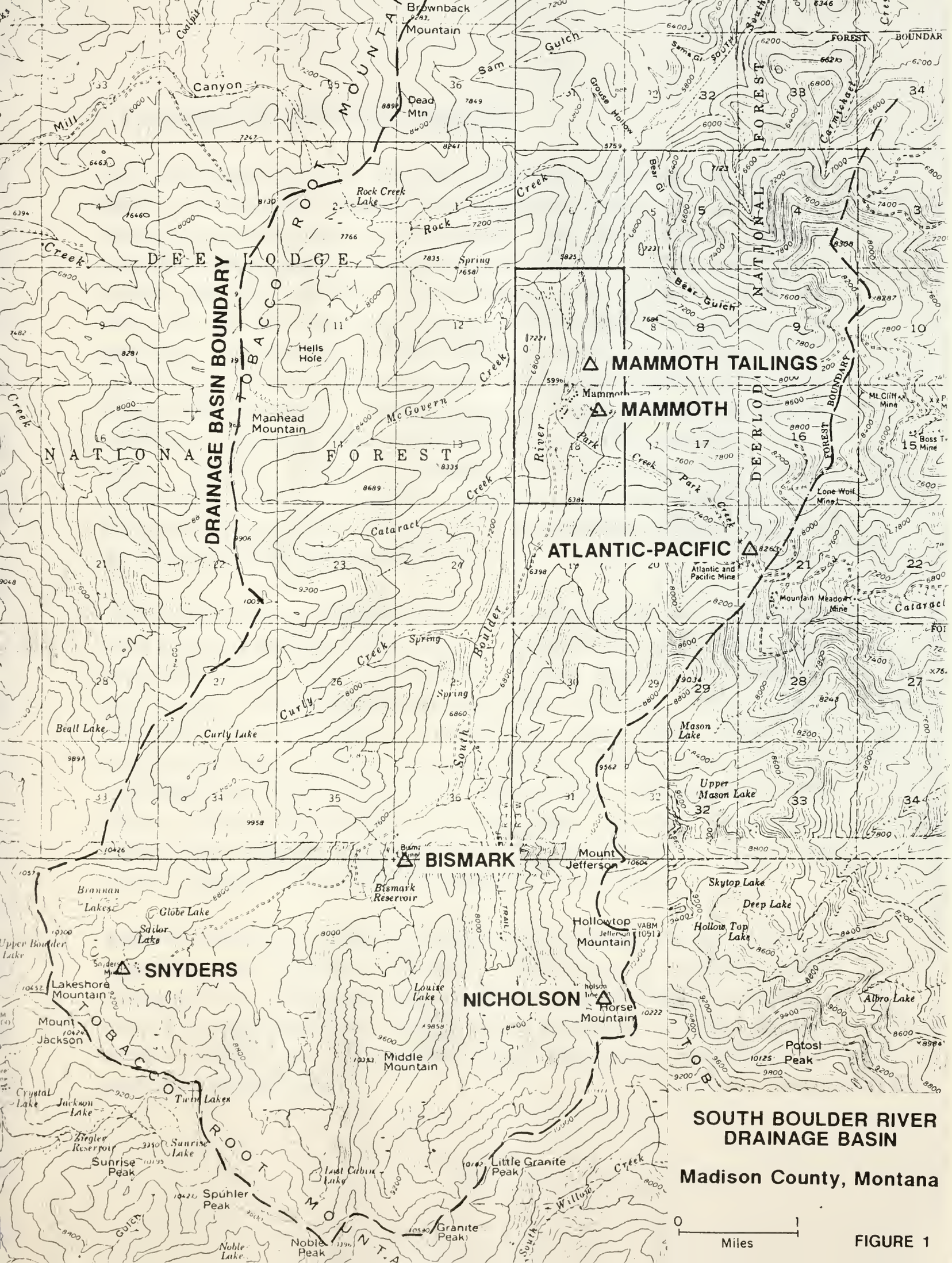
The Mammoth Mine and South Boulder River drainage basin is designated a pre-design area within the Abandoned Mine Reclamation program. During the 1987 field season Northern Engineering and Testing conducted an inventory of the basin to locate potential sources of contamination to the watershed, and identify hazardous mine openings and structures that may endanger public safety. The inventory investigated areas disturbed by historic mining activity in the drainage basin, as determined from aerial photos, literature review, computer searches, and field reconnaissance.

The inventory succeeded in locating numerous public hazards and potential/probable contributers of contamination to the South Boulder River. A total of 10 hazardous mine openings, 13 hazardous structures, 4 mine drainage sources, and 1 sediment source were identified from the four sites investigated.

A summary of the collected information is presented in the appendices. Appendix A contains a breakdown of the data base prioritization scheme, followed by a ranked list of the South Boulder sites. The current data base algorithm assigns higher priority to hazards than environmental problems. Appendix B is the memorandum issued May 1, 1987 reporting on the initial site visit to the Mammoth Mine. Appendix C is the laboratory report on the Mammoth Mine level 5 adit discharge provided by Radersburg Mining Company. Appendix D is the analytical report prepared for Northern of water samples taken of the Mammoth Mine level 1 discharge. Figure 1 locates the sites identified in the South Boulder River drainage basin and those inventoried during the 1987 field season.

Historic mining and milling at Mammoth created environmental degradation in the form of tailings piles, leach and settling ponds, waste rock piles, and mine openings. Approximately 350,000 tons of tailings occupy two separate piles within forty feet of the South Boulder River. The Mammoth tailings are the primary source of sediment degrading the water quality of the drainage basin. In addition, a potential human health hazards exists relating to fugitive dust blowing off the tailings, impacting residents of the Mammoth townsite, one half mile from the site. The property is currently under lease to Radersburg Mining Company who plan to concentrate the tailings on site and truck them to their mill for reprocessing.

A site visit to the Mammoth Mine was conducted April 28, 1988. In attendance were representatives of: Northern Engineering, DSL-Abandoned Mine Reclamation Bureau, Radersburg Mining Company, and Hydrometrics (consultant to the lessee). The purpose of the site visit was to discuss activities planned with the lessee and future activities necessary to further characterize hazards posed by the mine to human health and the environment. A memorandum issued May 1, 1987 summarizes this site visit and is included as Appendix B.



SOUTH BOULDER RIVER DRAINAGE BASIN

Madison County, Montana

FIGURE 1

2.0 HAZARDOUS MINE OPENINGS AND STRUCTURES

The South Boulder inventory included the Bismark, Nicholson, and Mammoth Mines. Two additional mines in the drainage; Snyders and Atlantic & Pacific were not included in the inventory. The Snyder Mine is remotely located at the headwaters of the South Boulder River and is not accessible by four wheel drive vehicle. We were directed by the Bureau not to pursue this site, that at a future date they would be inventoried using the AMR helicopter. The Atlantic & Pacific Mine, is located in the Pony Mining District, at the head of Park Creek, a tributary entering the South Boulder River at Mammoth. At the time of our inventory there were ongoing exploration activities which prohibited a thorough mine evaluation. This site is reported to have environmental problems associated with mine discharge and tailings. Both the Atlantic & Pacific and Snyders mines should be inventoried at a future date to determine what impacts they have on the South Boulder River drainage basin.

From the three mines inventoried, ten adits and one shaft were identified which currently threaten public safety. Several of the adits are in good condition and can best be protected through bulkhead installation. Several others have portals in various stages of collapse. These tunnel sites would best be treated by obstructing entry through backfill or blasting procedures. A forty foot deep shaft was located at the portal of the Mammoth Mine level three adit. Rotting boards currently cover the hazard, further contributing to the dangerous situation. This mine opening would best be treated by backfilling. Sufficient material is present adjacent to the shaft to accomplish this procedure.

Hazardous structures identified during the inventory include load-out structures, mill buildings, and smaller buildings used to support past mining activity. Historical significance of the inventoried structures has not yet been determined. Several of the structures at level 5 of the Mammoth tailings will be removed during reprocessing according to Radersburg Mining Company.

3.0 WATER QUALITY

The discharge (30-40 gpm) emanating from the Mammoth level 5 adit had once flowed across the large tailings pile contributing turbidity and degrading the South Boulder River. Radersburg Mining Company diverted the discharge around the tailings for mining purposes. The present diversion ditch prevents further entrainment of tailings and limits the impact of the discharge on the river. Analytical results from water samples taken of the Mammoth level 5 adit discharge were obtained from Radersburg Mining Company. The laboratory report is included in Appendix C. The adit discharge exhibits some evidence of degraded water quality, but it is not pronounced.

The Mammoth level 1 adit discharge and surface water emanating from the bases of waste rock dumps were sampled during the June, 1987 site visit. Laboratory reports are included in Appendix D. Generally, significant water degradation was not apparent at the time of sampling.

Inventories of land owners and wells and sampling of domestic water wells adjacent to the Mammoth Mine was to be completed for Radersburg Mining Company by a consultant as part of their permitting procedure for reprocessing.

Adit discharges were observed and sampled at both the Nicholson and Bismark Mines. Table 1 summarizes results of mine discharge sampling in the South Boulder River drainage basin.

Table 1

Mine Discharge Summary

SITE NAME	SOURCE	pH	Q (gpm)	TDS (mg/l)
Bismark	Adit	7.7	5-10	190
Mammoth Level 1	Caved Adit	7.4	10-15	60
Mammoth Level 1	Toe of Dump	7.2	NM	50
Mammoth Level 3	Toe of Dump	7.5	NM	60
Mammoth Level 5	Adit	7.7	30-40	90
Nicholson	Caved Adit	7.6	1-2	50
Nicholson	Adit	NM	9	NM

* NM (not measured)

4.0 CONCLUSIONS

The Radersburg Mining Company was noted to be actively working at the Mammoth Mine during the August 1987, aerial survey and photograph flight. The actual extent of its reprocessing activities in 1987 is not known. The company is presumably operating under a DSL Small Miners Exemption. (This information is confidential and could not be verified.) A water discharge permit authorized by the Montana Water Quality Bureau has been issued to Radersburg Mining Company which will require them to monitor ground water during and after their reprocessing activities. It does not appear the company has any responsiblity for reclaiming the spoil areas once the tailings have been removed.

A follow up site visit by the Bureau (or its agents) should take place at the conclusion of reprocessing activities to re-evaluate the millsite and verify whether the following potential human health and environmental hazards have been eliminated.

- Have tailings been removed and if so has revegetation of spoil areas taken place.

- Does fugitive dust from the tailings site continue to impact human habitation in the Mammoth townsite.

- Is the ditch diverting the level 5 adit discharge still preventing sedimentation to the South Boulder River.

A monitoring plan to document the human health hazards could be developed when post mining conditions have been evaluated followed by a remediation plan to correct any remaining problems.

The Atlantic & Pacific and Snyders Mines should be inventoried for hazardous mine openings and their impact on the basin's watershed should be assessed. The dangerous adits and shaft identified in the 1987 inventory and any others found should be included in a future Hazardous Mine Opening Project and permanently reclaimed. Further landowner contact will be required to pursue this action.

APPENDIX A

APPENDIX A

PRIORITIZATION WEIGHTS AND ENTRY RANKS

Category	Weight	Entries and Ranks
Safety hazard and Accessibility	15	No hazards 0 Hazards and hard access 1 Hazards and moderate access 2 Hazards and easy access 3
Water Quality	8	None 0 Potential environmental prob. 1 Documented environmental prob. 2 Potential human exposure 3 Documented human exposure 4
Air Quality	8	None 0 Potential human exposure 3 Documented human exposure 4
Unvegetated Area (acres)	5	None 0 <1 1 1-10 2 >10 3
Land Ownership	5	Private 1 Public 3
Land Use	4	Mining 0 Agricultural 1 Recreational 2 Residential 3 Urban or Park 4
Affected Population	5	None 0 <10 1 10-100 2 101-500 3 >500 4

Maximum Score: 175

APPENDIX A

DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
ABANDONED MINE INVENTORY
TYPE AND LOCATION

PA NO.	SITE	LEGAL DESCRIPTION	MINE TYPE	COUNTY	MINING DISTRICT	SMALLEST IDENTIFIED DRAINAGE BASIN	USGS QUAD	LATITUDE	LONGITUDE
29-082	Mammoth Tailings	T2S R3W S7 SW SE	Hardrock	Madison	South Boulder	South Boulder	Waterloo	N45 40 14	W112 00 48
29-008	Mammoth	T2S R3W S18 N NE	Hardrock	Madison	South Boulder	South Boulder	Waterloo	N45 40 00	W112 00 40
29-128	Nicholson	T3S R3W S7 NE NE	Hardrock	Madison	South Boulder	South Boulder	Waterloo	N45 35 40	W112 00 37
29-033	Atlantic/Pacific	T2S R3W S21 SW NW	Hardrock	Madison	Pony	Park Creek	Harrison	N45 39 00	W111 59 10
29-004	Bismark	T2S R4W S36 SW SW	Hardrock	Madison	South Boulder	South Boulder	Waterloo	N45 37 43	W112 02 30

DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
ABANDONED MINE INVENTORY
LAND USE AND SITE STATUS

PA NO.	SITE	LAND OWNERSHIP	LOCAL LAND USE	PROJECT NAME	PROJECT STATUS	ACTIVITY STATUS	DATE OF SITE VISIT	INVENTORY PERSON	PRIORITY SCORE	DATE OF LAST REVISION	ENTRY OPERATOR'S NAME	ENTRY OPERATOR'S ORGANIZATION
29-082	Mammoth Tailings	Private	Residential	So. Boulder	Pre-Design	Operating	4/28/87	Braun	143	05/14/87	Faber	Northern
29-008	Mammoth	Private	Recreational	So. Boulder	Pre-Design	Abandoned	4-28-87	Braun	82	10/01/87	Blixt	Northern
29-128	Nicholson	Public	Recreational	So. Boulder	Pre-Design	Abandoned	7-01-87	Braun	81	10/01/87	Blixt	Northern
29-033	Atlantic/Pacific	Private	Agricultural	So. Boulder	Pre-Design	Exploration	7/2/87	Braun	62	05/14/87	Faber	Northern
29-004	Bismark	Private	Recreational	So. Boulder	Pre-Design	Partial	7-01-87	Braun	61	10/01/87	Blixt	Northern

DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU
ABANDONED MINE INVENTORY
HAZARDS

PA NO.	SITE	ACCESS-IBILITY	NUMBER OF HAZARDOUS OPENINGS	NUMBER OF HAZARDOUS STRUCTURES	SLOPE STABILITY HAZARDS	UNVEGE-TATED AREA	AIR QUALITY PROBLEMS	WATER QUALITY PROBLEMS	AFFECTED POPULATION
29-082	Mammoth Tailings	Easy	None	1	Tailings	1-10	Potential human exposure	Documented human exposure	101-500
29-008	Mammoth	Moderate	5	1	Dump	<1	None	Potential human exposure	10-100
29-128	Nicholson	Moderate	4	3	Dump	1-10	None	Potential environmental prob.	10-100
29-033	Atlantic/Pacific	Moderate	None	None	Tailings	1-10	None	Potential environmental prob.	<10
29-004	Bismark	Moderate	2	0	Dump	None	None	Potential environmental prob.	10-100

APPENDIX B

Northern
Engineering
and Testing, Inc.

P.O. Box 4699
Helena, Montana 59601
(406) 443-5210

MEMORANDUM

DATE: May 1, 1987

TO: Ben Mundie, DSL-AMR Bureau

FROM: Roger Braun RB

RE: Mammoth Mine Site Visit

PROJECT NO. 87-3001 - I

This memo documents observations at the mine site, activities planned by the lessee, and future activities necessary to further characterize hazards posed by the mine to human health and the environment. The mine site was visited on April 28, 1987 by Roger Braun, Ben Mundie, Dennis Miller, Radersburg Mining Company, and Doug Rogness, Hydrometrics (Consultant for Radersburg Mining Company).

The Mammoth Mine is an abandoned hardrock (gold) mine in the South Boulder River Mining District, Madison County, Montana (Sec. 7 and 18, T2S, R3W). The mine is located in the Northern Tobacco Root Mountains adjacent to the South Boulder River. The mineralized zone which contains the ore occurs along the northwest-trending Mammoth fault zone that separates the Pony Gneiss from the Cherry Creek Gneiss. The elevation at the mine varies from 6,000 to 7,500 feet above mean sea level. The predominant vegetation is Lodgepole and Ponderosa Pine.

Historic mining and milling at Mammoth created environmental degradation in the form of tailings piles, leach and settling ponds, waste rock piles, and mine openings. Approximately 350,000 tons of tailings are planned to be reprocessed at the site. Mr. Dennis Miller of the Radersburg Mining Company, the current lessee of the property, indicated that these tailings will be concentrated using water-gravity down to 35,000 tons that will be trucked to their mill near Radersburg. Mr. Miller indicated that the remaining tailings would be regraded and seeded to native vegetation.

The tailings to be reprocessed occupy two separate piles: the large (approximately five acres) site near the 5-level portal which is immediately visible to travelers, the base being approximately 40 feet above the South Boulder River; and a second smaller tailings pile approximately 500 feet south of the major pile. It is planned to slurry the smaller pile down to the larger site. Mr. Miller said that waste rock piles at the various mine openings at the 1st, 2nd and 3rd levels are not planned for reprocessing due to the lack of sufficient ore. The enclosed sketch shows relative locations of these various features; the first level is approximately 800 feet above the large tailings pile near level 5 with the 2nd and 3rd levels at intermediate elevations. Also, dilapidated mill buildings and other wooden structures at levels 1, 2, and 3 are not planned for removal during reprocessing. However, structures near level 5 on the large tailings pile will be removed. Radersburg Mining Company is currently awaiting definition of regulatory requirements, but anticipates the need for only a Montana Ground Water Pollution Control System Permit for their planned reprocessing operation at the Mammoth Mine.

Several mine openings were inspected during our site visit. The level 5 opening (the lowest adit) is presently closed-off with wood doors and appears securely locked.

The level 3 workings near the old mill structures has two separate mine openings situated about 20 feet apart vertically. The lower, larger adit may be best closed by filling with waste rock from the adjacent pile; the upper adit is partially caved and could be sealed by blasting. Two other adits exist on level 3 approximately 1000 feet north of the old mill structure. A narrow gauge rail car apparently carried the ore along grade to the mill on level 3. The adits are both partially caved and are separated approximately 20 feet vertically. Both of these adits could be closed by filling and/or blasting.

At the level 2 mine workings, a shaft at least 50 feet deep exists in the portal of the adit. The shaft opening is presently partially covered with old wood timbers. This shaft should be sealed with waste rock. The adit at level 2 had been closed with a wood structure and door, but had been knocked down and no longer serves to preclude access. The portal at this adit appeared competent and should allow use of an iron gate and lock.

At level 1, the mine opening had caved and no adit or shaft openings could be found. However, a small stream (10 to 15 gpm) emanating from the caved zone, several wooden structures, and a waste rock pile all suggest that a mine opening had existed at this site. This caved area should be investigated to assure that the zone is stable and will not reopen due to further subsidence.

Water emanates from level 5 and has been diverted around the large tailings pile. This discharge was estimated at 30 to 40 gpm. This discharge had flowed across the tailings contributing turbidity and degrading the South Boulder River. The present diversion ditch prevents entrainment of tailings and limits the impact of the discharge on the river. Water from the level 5 adit discharge was sampled by Radersburg Mining Company but results have not yet been received.

The water that discharges from the level 1 caved adit continues down its original course until it reaches the next lower level where it infiltrates into a waste rock pile. The stream again surfaces at the toe of each successive waste rock pile. At the toe of the level 3 waste rock pile, this stream had an estimated discharge of 30 gpm.

As part of a comprehensive reclamation plan at the Mammoth Mine Site, it was suggested during discussions with Mr. Miller that the various waste rock piles be incorporated into the reprocessing of tailings. Thus, these piles would be moved off the mountain side and incorporated into the regraded and reclaimed area near level 5. The Radersburg Mining Company may be interested in this action if the increased costs could be offset by AMR.

Future activities for characterizing the Mammoth site for AMR include:

- Obtaining water quality results, old mining maps and other pertinent information on the site from Radersburg Mining Company;

- Obtain low-level aerial photographs of the site, to be flown by DSL;

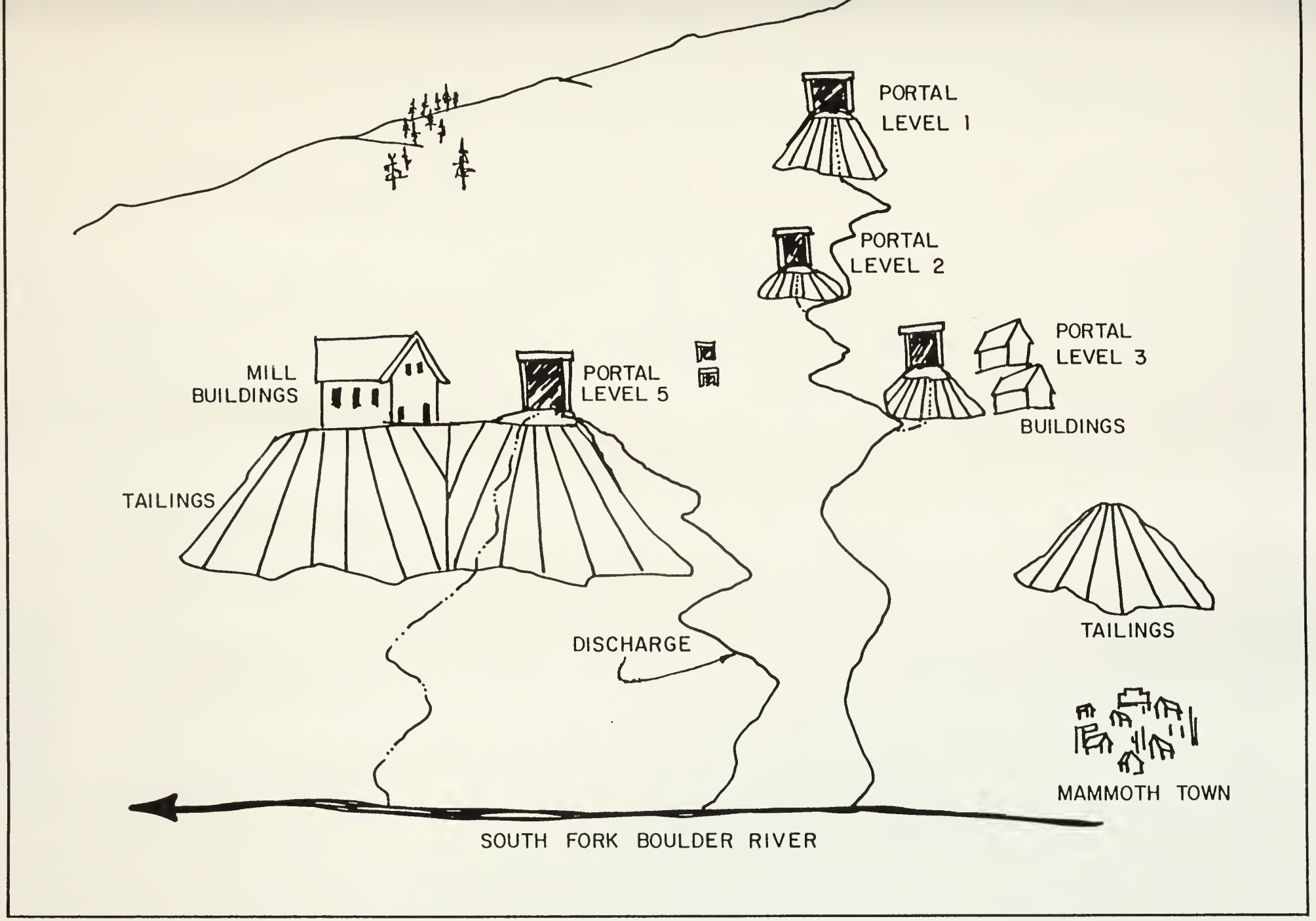
- Inventory adjacent property ownership and water wells;

- Sample domestic wells, monitoring wells, adit discharges and surface water emanating from waste rock piles;

- Document other hazards to human health;

- Begin preliminary design for sealing mine openings and any other necessary actions;

- Inventory other hardrock mines in the South Boulder River basin, paying particular attention to discharging adits or leach facilities.



Sketch view looking east at Mammoth Mine. Not to scale.

APPENDIX C

ENERGY LABORATORIES, INC.
P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325

LABORATORY REPORT

To: Radersburg Mining Co. (1) Lab No.: 87-2953
Address: Box 25-A Date: 4-2-87 tab
Parker Loop
Toston, Montana 59643
ATTN: Bobby Lavinder

WATER ANALYSIS

Portal - Mammoth
Sampled 3-18-87 pm
Submitted 3-25-87

CONSTITUENT	mg/l
Calcium	110
Magnesium	65
Sodium	11
Potassium	3
Bicarbonate as CaCO3	114
Sulfate	437
pH	7.4 standard units
Specific Conductance @ 25°C	950. umhos/cm

METALS:

	mg/l	
	Dissolved	Total Recoverable
Arsenic	<0.005	0.010
Lead	<0.01	<0.01
Chromium	<0.02	<0.02
Cadmium	<0.001	<0.001
Zinc	0.03	0.07
Iron	<0.03	1.05
Copper	<0.01	0.09

APPENDIX D

RECEIVED JUL 0 6 1987

MOUNTAIN STATES ANALYTICAL

ANALYTICAL REPORT

July 2, 1987
Job No: 87-911
Sheet No. 1 of 2
Invoice No. 870702-01

NORTHERN ENGINEERING AND TESTING, INC.
ATTN: MR. ROGER BRAUN
P O BOX 4699
HELENA MT 59604

Report of: Water Analysis - Mammoth

Sample Identification:

On June 9, 1987, these water samples were delivered to our laboratory for analysis. Tests were conducted in accordance with the U.S. Environmental Protection Agency Manual EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes." The results of the analysis are shown on the following page.

Reviewed by Deborah A. Jimmi

rmr

Mountain States Analytical

WATER ANALYSIS
MAMMOTH
87-3001-I

July 2, 1987
Job No. 87-911
Sheet 2 of 2

TEST RESULTS:

Lab No.:	89611	89612	89613	89614	
Sample Description:	Level 1 Adit	Level 1 Waste	Level 3 Waste	Level 5 Adit	Date
Date Sampled:	6/07/87	6/07/87	6/07/87	6/07/87	Analyzed
Calcium as Ca, mg/l	8	9	9	11	6/09/87
Magnesium as Mg, mg/l	15	3	3	4	6/09/87
Sodium as Na, mg/l	3	3	3	3	6/09/87
Potassium as K, mg/l	1	<1	<1	1	6/18/87
Bicarbonate as HCO_3, mg/l	30	39	35	41	
Total Alkalinity, mg/l	25	32	29	34	6/09/87
Chloride as Cl, mg/l	1	<1	3	3	6/18/87
Sulfate as SO_4, mg/l	59	10	8	13	6/18/87
Nitrate+Nitrite as N, mg/l	0.16	0.23	0.15	0.22	6/22/87
Total Cyanide as CN, mg/l	<0.010	<0.010	<0.010	<0.010	6/16/87
Dissolved Metals, mg/l					
Arsenic as As	<0.005	<0.005	<0.005	<0.005	6/10/87
Chromium as Cr	<0.02	<0.02	<0.02	<0.02	6/11/87
Copper as Cu	0.05	0.06	<0.02	0.07	6/11/87
Iron as Fe	<0.05	<0.02	<0.02	<0.02	6/11/87
Lead as Pb	<0.02	<0.02	<0.02	<0.02	6/11/87
Zinc as Zn	0.10	0.02	<0.02	0.03	6/11/87